

PRELIMINARY DATA SUMMARY

January 1985

U.S. Army Engineer Waterways Experiment Station
Coastal Engineering Research Center
Field Research Facility
Duck, North Carolina

PRELIMINARY DATA SUMMARY

CERC Field Research Facility Duck, North Carolina

This report provides a summary of basic oceanographic, meteorological and bottom profile data for the month. The data were obtained as part of the Field Research Facility Measurement and Analysis Work Unit at the U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's Field Research Facility in Duck, North Carolina. The data were collected and the analyses performed by the FRF staff. These summaries are intended to make the data readily available to all FRF users, and comments on their content and usefulness are invited.

CONTENTS

	Page
COVER	
TITLE PAGE	
TABLE OF CONTENTS	1
I INTRODUCTION	2
II METEOROLOGICAL DATA.	6
III WAVE DATA.	9
IV CURRENT DATA	14
V SUPPLEMENTAL OBSERVATIONS.	20
VI WATER LEVELS	22
VII NEARSHORE PROFILES AND BATHYMETRY.	26
VIII SPECIAL EVENTS	29
FIGURES	
1 LOCATION MAP	3
2 INSTRUMENT LOCATIONS	5
3 TIME HISTORY OF WAVE HEIGHTS AND PERIODS	12
4 TIDE RANGE TIME HISTORY.	23
5 WATER LEVEL TIME HISTORY	24
6 CRAB PROFILES.	26
7 CRAB PROFILE ENVELOPE.	27
8 FRF CONTOUR DIAGRAM.	28
TABLES	
1 INSTRUMENT STATUS/DATA AVAILABILITY.	4
2 METEOROLOGICAL DATA.	7
3 WAVE DATA.	10
4 CURRENT DATA	15
5 SUPPLEMENTAL OBSERVATIONS.	21
6 TIDAL CHARACTERISTICS.	25

I. INTRODUCTION

The U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's (CERC) Field Research Facility (FRF) is located on the Outer Banks of North Carolina, near the village of Duck (Fig. 1).

The FRF research program provides a means for obtaining high-quality field data, particularly during storms, in support of the U.S. Army Corps of Engineers' coastal engineering research missions. The FRF consists of a 561-m (1,840 ft) long concrete research pier supported on 0.91 m (3 ft) diameter steel piles. The pier deck is 6.1 m (20 ft) wide, 7.74 m (25.4 ft) above mean sea level (MSL), and extends from behind the dunes to approximately the 7.6 m (25 ft) depth contour. In addition, a main building contains offices, an instrument repair shop, and a data acquisition room.

One of the responsibilities of the FRF research program is the collection, analysis, and dissemination of data on local oceanographic and meteorological conditions. Bottom profiles along both sides of the pier and periodic bathymetric surveys are also performed.

This summary is intended to provide basic data as soon as possible after they are obtained. Most of the data are daily observations or the results of preliminary data analysis. In many instances, continuous analog records and more extensive analyses will be made available later by the CERC Coastal Engineering Information and Analysis Center (CEIAC).

Table 1 is a list of instruments used, their status during the month, and the data collection status. Figure 2 identifies the location of the instruments. The water depth at the wave gages and current meters vary and may best be determined from the information contained in Figure 8. Other installation information is contained in Table 1. All times unless otherwise specified are referenced to Eastern Standard Time (EST).

Section II presents the meteorological data; Sections III through VI, oceanographic data; Section VII, nearshore profiles and bathymetry; and Section VIII, if included, documents special events that occurred at the FRF during the month.

Questions and/or comments concerning the data may be directed to Mr. H. Carl Miller at (919) 261-3511.

Figure 1 - FRF Location Map

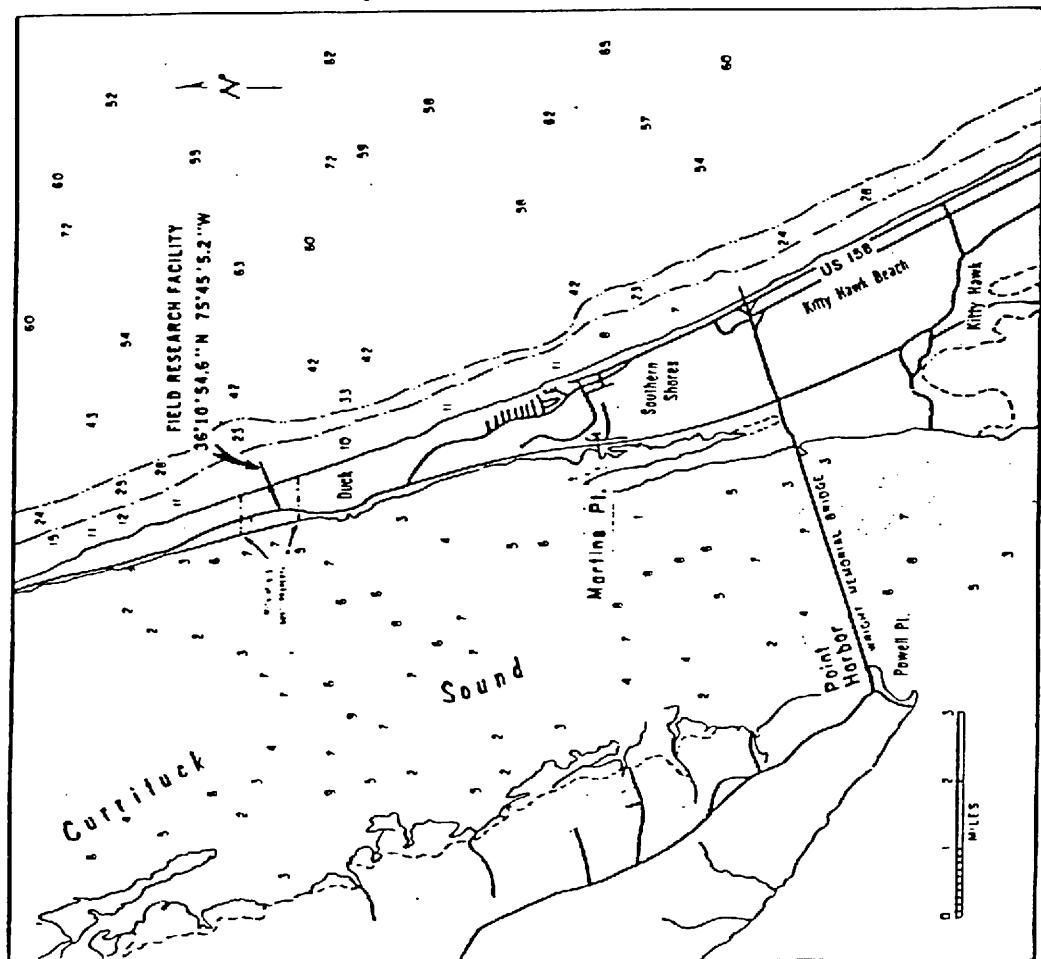
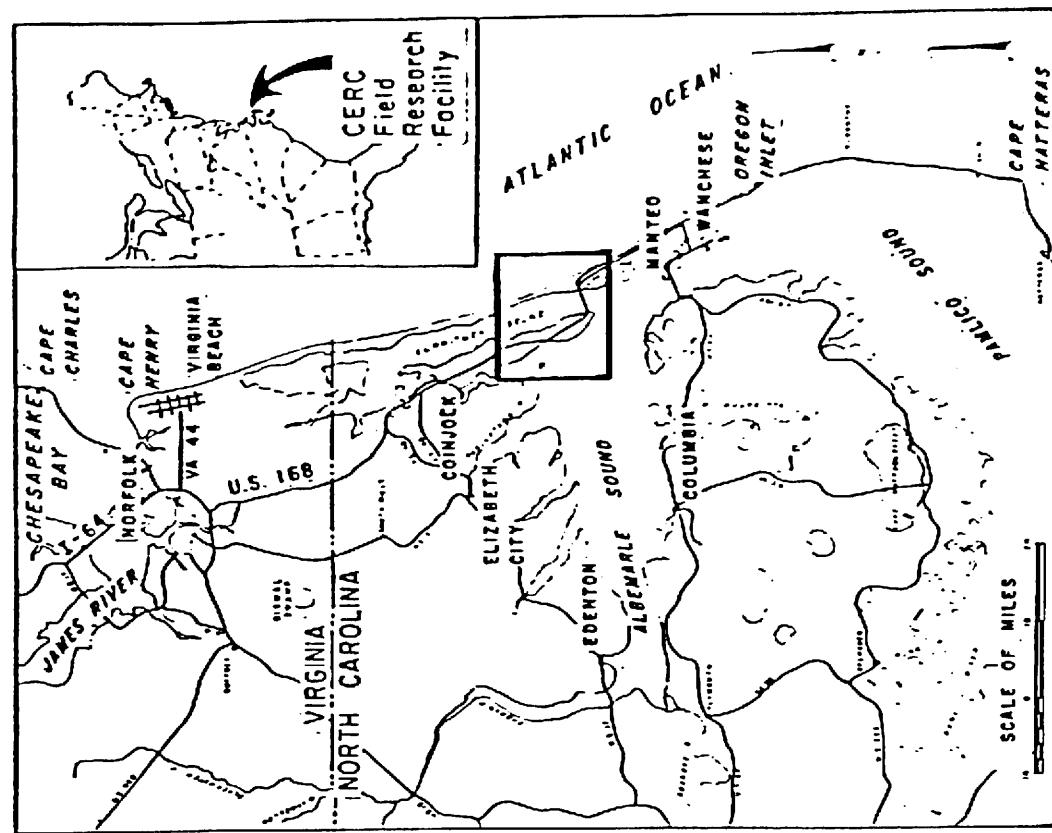


TABLE 1
INSTRUMENT STATUS/DATA AVAILABILITY
January 1985
DAY OF THE MONTH
1/23/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31

GAGE NUMBER	DESCRIPTION/REMARKS	DEPTH AT SENSOR	Instrument Status											
			Data Collected	Analog Record	Instrument Status	Data Collected	Analog Record	Instrument Status	Data Collected	Analog Record	Instrument Status	Data Collected	Analog Record	Instrument Status
	Barometric Pressure		△	△	△	△	△	△	△	△	△	△	△	△
	Precipitation		△	△	△	△	△	△	△	△	△	△	△	△
	Air Temperature		△	△	△	△	△	△	△	△	△	△	△	△
	Anemometer on Lab Bluff - Elevation 19m (MSL)		△	△	△	△	△	△	△	△	△	△	△	△
645	Baylor staff located at station 7480 on RRF pier	See profile data	△	△	△	△	△	△	△	△	△	△	△	△
625	Baylor staff located at station 19400 on RRF pier	See profile data	△	△	△	△	△	△	△	△	△	△	△	△
640	Waverider buoy located 1.0 km from shore	Approx. 6.5 m. MSL	△	△	△	△	△	△	△	△	△	△	△	△
630	Waverider buoy located 6.0km from shore	Approx. 18 m. MSL	△	△	△	△	△	△	△	△	△	△	△	△
639	Current meter at station 14420 on RRF pier	See profile data	△	△	△	△	△	△	△	△	△	△	△	△
679	Current meter 500m south (0.3km offshore)	Approx. 6 m. MSL	△	△	△	△	△	△	△	△	△	△	△	△
865-1370	HOLA primary tide station located at seaward end of RRF pier	See profile data	△	△	△	△	△	△	△	△	△	△	△	△

Instrument Status: Operational - Daily Observation: YES - Analog Record: ALL , PARTIAL
 Data Collected: ALL , SOME Preliminary Analysis: ALL , SOME

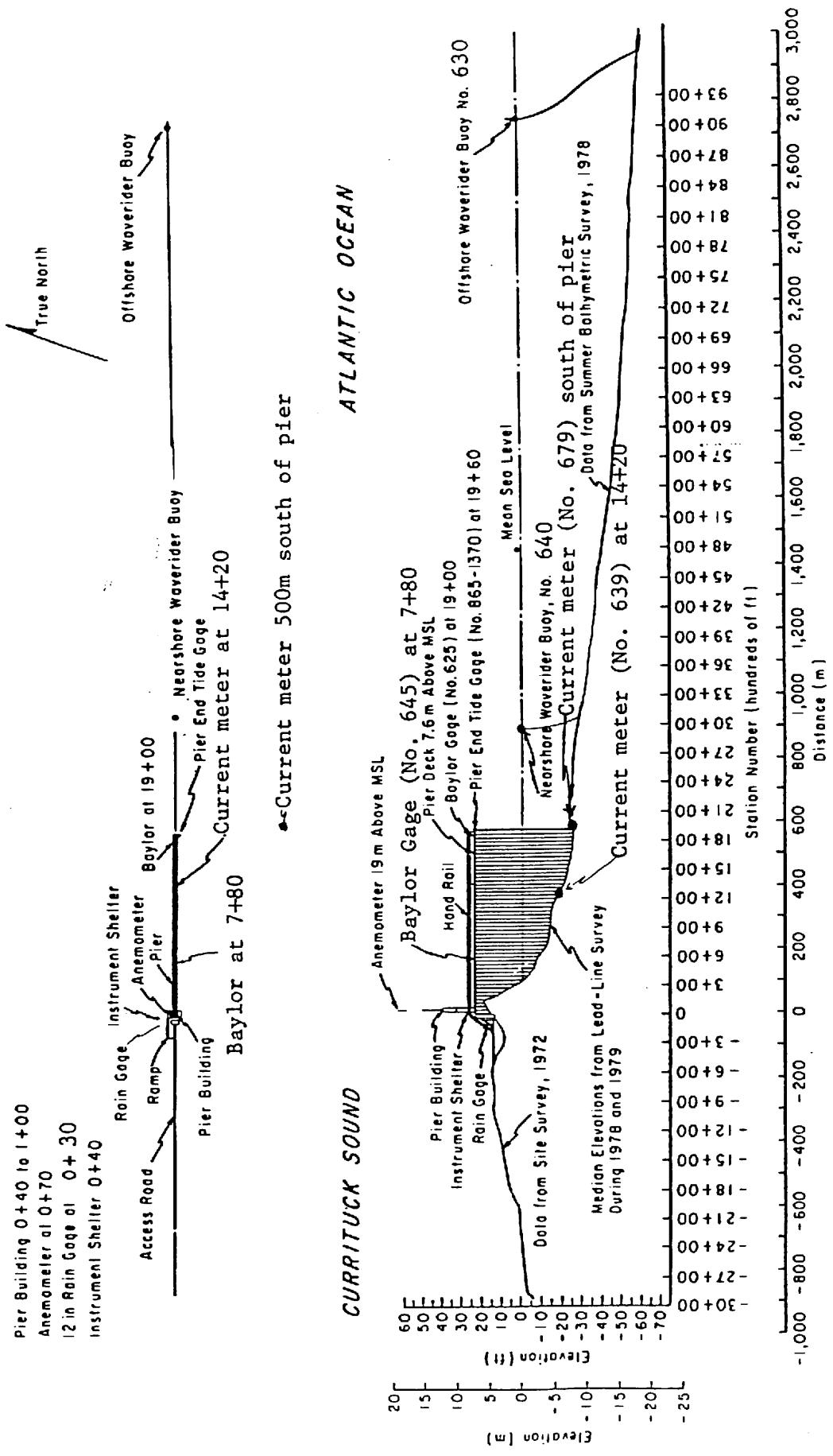


Figure 2. Instrument Locations at FRF

II. METEOROLOGICAL DATA

A variety of instruments have been installed at the FRF (Fig. 2) to monitor the meteorological conditions. The data presented in Table 2 are collected and stored on magnetic tape using a Data General NOVA-4 computer. For each instrument identified in Table 1 as having analog outputs, chart records are obtained, a log is maintained and the records are stored for future reference.

The wind measurements are obtained from a Weather Measure Skyvane located on the FRF laboratory building (Fig. 2), 19.1 m above mean sea level (MSL).

The high and low temperatures are obtained from daily readings of NWS maximum and minimum thermometers and represent the extreme temperature values since the last reading.

The following may be useful for converting the data in Table 2 to other frequently used units of measurement:

1. Millimeters (mm) to inches (in) -
 $mm \times .03937 = in$
2. Millibars (mb) to inches of mercury (in Hg) -
 $mb \times 0.02953 = in Hg$
3. Degrees Celcius ($^{\circ}C$) to degrees Fahrenheit ($^{\circ}F$) -
 $(^{\circ}C \times 9/5) + 32 = ^{\circ}F$
4. Meters per second (m/s) to knots (kn) -
 $m/s \times 1.943 = kn$

TABLE 2: METEOROLOGICAL DATA

PART 1

JANUARY 1985

DAY	WIND SPEED HOUR	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
1	100	1	84	10.4	1024.4
	700	2	166	10.5	1023.5
	1300	5	248	19.8	1021.5
	1900	5	207	17.3	1021.2
2	100	4	213	16.9	1021.8
	700	2	223	14.9	1021.4
	1300	3	212	22.0	1020.0
	1900	10	9	11.1	1021.1
3	100	12	39	9.3	1022.9
	700	13	47	9.5	1022.5
	1300	14	48	9.5	1019.2
	1900	12	35	10.1	1016.2
4	100	12	23	9.1	1013.6
	700	10	28	7.4	1010.9
	1300	5	23	9.9	1004.5
	1900	5	343	7.8	1000.2
5	100	13	274	6.3	1000.1
	700	10	311	4.4	1004.7
	1300	9	332	5.8	1009.9
	1900	5	308	5.1	1017.6
6	100	3	332	2.5	1021.6
	700	3	312	1.5	1022.9
	1300	2	271	7.5	1021.5
	1900	3	199	6.2	1019.9
7	100	3	234	6.2	1016.5
	700	5	264	6.7	1013.0
	1300	11	256	8.8	1005.7
	1900	9	266	8.5	1007.0
8	100	8	269	6.6	1007.9
	700	7	296	4.3	1009.9
	1300	7	315	7.7	1011.4
	1900	4	314	4.9	1015.4
9	100	8	346	1.1	1020.9
	700	8	343	-1.8	1026.0
	1300	9	6	.4	1028.0
	1900				1028.7
10	100		Operator Error		1031.4
	700	8	83	4.5	1028.3
	1300	9	65	5.1	1024.6
	1900	13	76	6.7	1019.5
11	100	10	14	6.8	1015.5
	700	7	333	2.2	1015.1
	1300	5	318	1.1	1014.4
	1900				1016.5
12	100		System Error		1018.2
	700	7	320	-4.0	1018.8
	1300	9	336	.5	1018.2
	1900	6	297	-0	1018.2
13	100	8	295	-1.0	1017.3
	700	8	293	-2.1	1017.7
	1300	7	265	3.4	1015.6
	1900	4	246	2.7	1013.9
14	100	6	265	3.0	1012.2
	700	5	243	1.6	1010.3
	1300	6	230	7.2	1004.4
	1900	9	258	4.4	1000.5
15	100	10	287	3.9	1000.6
	700	11	302	-3	1006.2
	1300	10	310	2.1	1011.3
	1900	7	321	.2	1017.0
16	100	9	337	-2.5	1021.2
	700	8	342	-5.4	1025.2
	1300	6	0	-1.1	1026.0
	1900	2	49	-1.3	1024.6

TABLE 2: METEOROLOGICAL DATA

PART 2

JANUARY 1985

DAY		WIND SPEED HOUR	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
17	100	1	208	-7	1021.2	0
	700	9	128	3.2	1010.4	0
	1300	4	277	2.9	1001.8	12
	1900	4	287	1.9	1001.2	0
18	100	4	319	-6	1004.2	0
	700	2	263	-1	1004.5	0
	1300	2	233	4.7	1002.9	0
	1900	3	199	2.0	1002.5	0
19	100	6	249	3.3	1002.5	0
	700	5	243	2.9	1001.4	0
	1300	7	257	5.3	1001.6	0
	1900	5	254	5.0	1004.8	0
20	100	3	264	2.9	1006.0	0
	700	8	219	6.4	1002.4	0
	1300	11	349	-8.1	1005.7	0
	1900	10	325	-10.5	1011.2	0
21	100	12	315	-16.2	1016.7	0
	700	9	288	-17.1	1017.1	0
	1300	11	296	-11.7	1014.6	0
	1900	10	282	-9.5	1015.3	0
22	100	11	280	-8.0	1014.4	0
	700	8	294	-9.4	1013.9	0
	1300	7	283	-2.2	1012.8	0
	1900	5	291	-2.8	1013.8	0
23	100	5	307	-4.7	1015.4	0
	700	6	271	-5.4	1014.4	0
	1300	7	263	1.1	1010.6	0
	1900	6	270	-8	1009.4	0
24	100	5	260	-1.2	1009.6	0
	700	6	276	-1.2	1011.2	0
	1300	7	253	5.3	1008.9	0
	1900	4	212	2.5	1005.4	0
25	100	8	255	3.1	1004.8	0
	700	4	242	.5	1004.8	0
	1300	3	268	6.3	1002.1	0
	1900	6	230	3.6	930.2	0
26	100	11	305	-8	981.9	0
	700	11	312	-2.1	1010.5	0
	1300	9	350	-8	1015.9	0
	1900	4	330	-1.2	1020.8	0
27	100	4	304	-3.1	1021.9	0
	700	3	271	-4.1	1020.9	0
	1300	6	256	4.2	1015.7	0
	1900	4	215	3.8	1013.6	0
28	100	4	254	1.1	1012.9	0
	700	3	272	-4	1011.7	0
	1300	3	346	2.8	1010.5	0
	1900	8	41	1.4	1010.7	0
29	100	11	15	2.2	1010.9	0
	700	12	17	2.2	1014.0	0
	1300	11	19	2.7	1018.1	0
	1900	5	47	1.4	1020.2	0
30	100	4	308	-1.2	1021.9	0
	700	2	313	-2.7	1022.5	0
	1300	2	245	3.2	1022.6	0
	1900	4	198	2.2	1023.0	0
31	100	4	146	3.8	1021.7	0
	700	7	120	6.4	1015.9	3
	1300	9	263	9.9	1010.7	22
	1900	3	22	5.6	1013.8	0

III. WAVE DATA

Wave data were collected from two Baylor staff gages (CERC gage nos. 625 and 645) and Waverider buoys (CERC gage nos. 630 and 640, Table 1 and Figure 2). The data were collected, analyzed, and stored on magnetic tape using a Data General NOVA-4 computer.

The NOVA-4 is programmed to sample the wave gages every 6 hours near 0100, 0700, 1300, and 1900 EST at a sampling rate of four times per second, collecting data in 20-minute records.

Wave height (H_{mo}) is an energy-based statistic equal to four times the standard deviation of the sea surface elevations. The wave period is identified from the computation of a variance (energy) spectrum using a Fast Fourier Transform of 4096 data points (1024 sec). The period (T_p) is that associated with the maximum energy density in the spectrum. When this analysis is complete, the data are written to magnetic tape and entered into the CERC data base.

Table 3 presents the wave heights and periods for each wave record obtained during the month. The monthly means shown in Table 3 are an average of the values computed for all data records collected. The monthly standard deviations are standard deviations from the monthly mean of values for each record.

Figure 3 is a time history of the H_{mo} and T_p values for the Waverider 6 km from shore (630) and the Baylor gage at pier station 19+00 (625).

Differences in wave periods between wave gages (Table 4 and Figure 3) may be due to wave breaking or reformation, or the presence of multiple wave trains containing nearly equal energy.

TABLE 3: WAVE DATA

PART 1

JANUARY 1985

DATE DAY	TIME	645		625		640		630	
		Baylor at 7:00 Hao(m)	T(sec)	Baylor at 19:00 Hao(m)	T(sec)	Nearsho Wvrdr Hao(m)	T(sec)	Forsht Wvrdr Hao(m)	T(sec)
1	1	.52	6.40	.63	6.87	.70	5.31	.74	7.42
	7	.38	5.63	.56	8.06	.57	8.06	.70	9.83
	13	.30	5.99	.49	6.87	.58	8.06	.63	6.87
	19	.39	5.31	.51	8.83	.53	8.06	.71	6.87
2	1	.42	5.99	.53	6.40	.57	5.99	.79	6.40
	7	.36	5.99	.43	6.40	.50	6.40	.74	6.87
	13	.42	5.99	.45	6.40	.51	5.99	.73	6.87
	19	.48	7.42	.66	7.42	.71	8.06	.89	7.42
3	1	1.23	5.63	1.49	5.63	1.48	5.63	1.74	5.63
	7	1.34	6.40	1.72	7.42	1.90	6.87	2.33	6.87
	13	1.22	8.06	2.53	8.06	2.42	8.06	2.81	8.06
	19	1.34	8.06	2.73	8.06	2.57	8.06	2.88	8.06
4	1	1.33	8.83	2.35	6.87	2.32	8.06	2.86	8.06
	7	1.50	9.75	1.98	7.42	2.03	7.42	2.16	8.83
	13	1.20	8.83	1.61	9.75	1.67	8.83	1.78	6.87
	19	1.12	9.75	1.34	9.75	1.39	9.75	1.39	7.42
5	1	.40	6.87	.66	9.75	.64	8.83	1.02	9.75
	7	.33	8.06	.46	9.75	.53	9.75	.93	3.05
	13	1.20	6.40	1.04	5.99	1.02	5.99	1.42	5.99
	19	1.06	6.40	1.00	6.87	.98	6.87	1.25	6.87
6	1	1.11	5.99	1.01	8.06	.93	6.87	1.16	7.42
	7	.71	5.63	.85	7.42	.88	5.31	1.04	6.87
	13	.67	6.40	.71	6.87	.73	7.42	.87	5.99
	19	.45	5.99	.60	9.75	.59	6.40	.73	6.40
7	1	.29	8.83	.45	8.83	.44	10.89	.49	8.83
	7	.20	10.89	.35	12.34	.35	9.75	.38	8.83
	13	.14	9.75	.33	9.75	.26	9.75	.63	2.95
	19	.18	7.42	.30	8.06	.31	8.83	.48	2.35
8	1	.15	8.06	.26	8.06	.27	8.06	.44	9.75
	7	.20	4.76	.29	8.06	.29	10.89	.47	3.38
	13	.74	4.76	.72	4.76	.73	4.53	.85	4.53
	19	.57	4.13	.66	4.76	.72	4.76	.88	5.02
9	1	1.25	6.40	1.67	6.87	1.61	6.40	1.96	6.40
	7	1.37	6.87	1.58	6.40	1.72	6.87	1.97	5.63
	13	1.12	7.42	1.41	6.40	1.38	8.06	1.75	5.99
	19								
10	1								
	7	.89	5.02	.95	7.42	1.12	5.31	1.15	6.40
	13	.97	6.87	1.05	4.13	1.29	4.32	1.14	4.76
	19	1.19	5.99	1.74	5.31	1.90	5.63	1.93	5.31
11	1	1.16	6.87	1.64	6.40	1.91	6.87	1.94	6.40
	7	1.16	5.99	1.31	6.40	1.70	6.40	1.76	6.87
	13	1.02	6.40	1.05	6.87	1.20	7.42	1.38	6.87
	19								
12	1								
	7	1.12	7.42	1.52	6.87	1.69	6.87	1.82	6.87
	13	1.22	8.06	1.37	8.06	1.44	6.87	1.72	7.42
	19	1.04	6.87	1.09	6.40	1.11	8.06	1.18	6.87
13	1	.72	6.87	.74	8.06	.84	6.40	.99	7.42
	7	.58	6.40	.57	9.75	.63	9.75	.73	6.40
	13	.33	5.99	.40	8.06	.56	8.83	.52	6.40
	19	.27	6.40	.38	8.06	.51	7.42	.38	5.99
14	1	.15	10.89	.23	5.99	.29	10.89	.48	2.30
	7	.23	6.40	.31	10.89	.36	10.89	.44	2.14
	13	.20	12.34	.30	10.89	.38	12.34	.48	6.87
	19	.25	10.89	.33	10.89	*		.53	2.35
15	1	.18	12.34	.29	8.06	.29		.69	3.26
	7	.88	5.02	.83	4.76	.98	4.76	1.21	5.02
	13	1.12	6.87	1.19	6.87	1.39	6.40	1.59	7.42
	19	1.07	6.40	1.10	6.87	1.20	6.87	1.32	6.40
16	1	1.25	6.87	1.28	6.87	1.43	6.87	1.83	7.42
	7	1.10	6.87	1.40	5.63	1.43	6.40	1.80	6.87
	13	1.05	6.40	1.32	8.06	1.41	8.06	1.54	7.42
	19	.92	6.40	1.00	6.40	1.04	5.63	1.06	8.06

*=Electronic problem

TABLE 3: WAVE DATA

PART 2

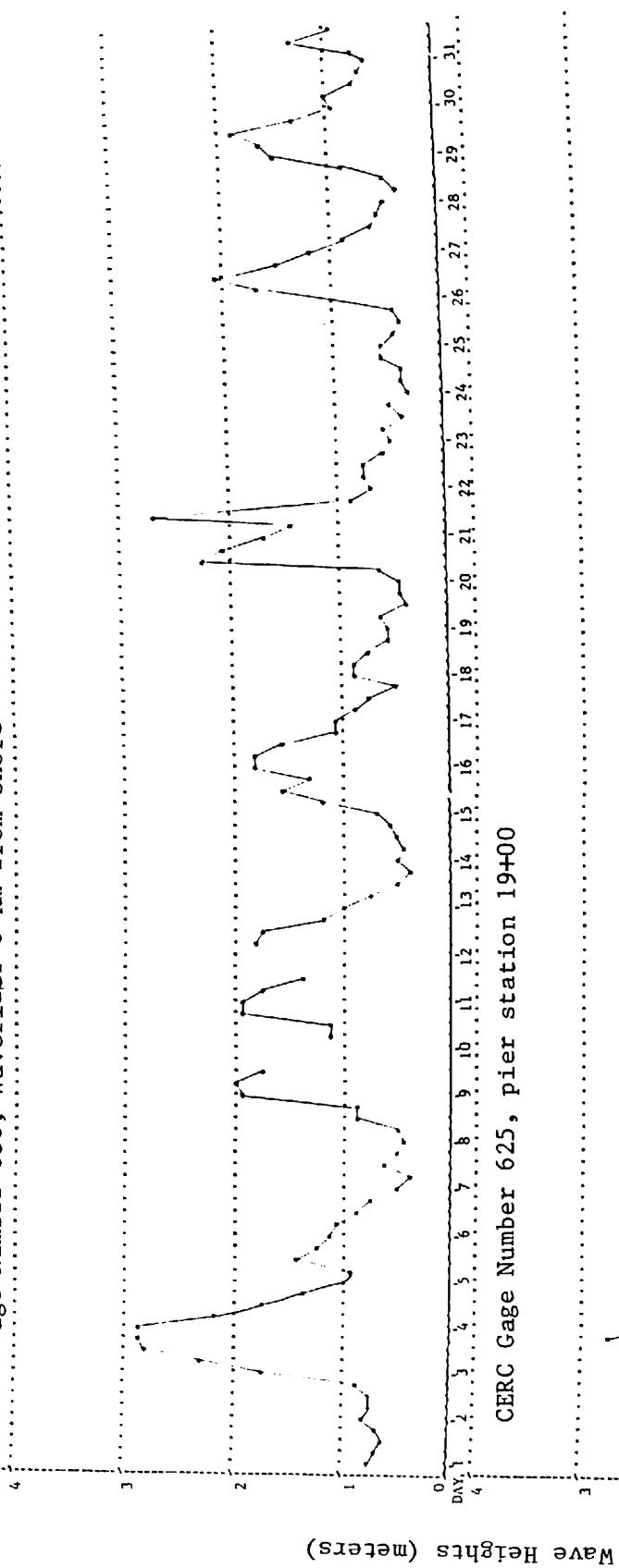
JANUARY 1985

GAGE		645		625		640		630	
DAY	TIME	Baylor at 7480 H(m) T(sec)		Baylor at 19400 H(m) T(sec)		Nearsh. Wvrdr H(m) T(sec)		Farshr. Wvrdr H(m) T(sec)	
17	1	.81	6.87	.85	7.42	.93	5.99	1.05	7.42
	7	.62	6.87	.75	8.06	.77	5.99	.86	7.42
13		.52	5.02	.66	8.83	.71	8.83	.73	5.99
19		.30	8.06	.45	7.42	.45	8.06	.53	6.87
18	1	.41	10.89	.57	10.89	.56	12.34	.89	10.89
	7	.35	12.34	.47	10.89	.61	10.89	.73	12.34
13		.39	12.34	.56	10.89	.59	12.34	.73	10.89
19		.36	4.76	.46	9.75	.55	5.31	.59	6.87
19	1	.26	9.75	.43	9.75	.45	9.75	.55	9.75
	7	.25	9.75	.38	9.75	.41	9.75	.60	9.75
13		.23	8.83	.35	9.75	.37	8.83	.39	10.89
19		.17	9.75	.28	9.75	.31	8.83	.44	8.83
20	1	.24	9.75	.31	7.42	.35	9.75	.45	8.06
	7	.36	2.69	*	*	*	*	.62	2.78
13		1.13	6.40	1.84	6.40	1.81	6.40	2.25	6.40
19		1.24	7.42	1.44	8.83	1.52	7.42	2.08	8.83
21	1	*	*	1.22	5.63	2.01	6.87	1.69	6.87
	7	.62	6.40	.68	8.83	1.37	16.79	1.42	6.87
13		*	*	.37	8.83	.39	10.89	2.70	7.42
19		.28	4.53	.37	4.76	.51	4.53	.88	3.15
22	1	*	*	.23	8.83	.31	20.48	.71	3.26
	7	.20	5.31	.27	7.42	.39	4.76	.72	3.51
13		.54	5.02	.54	5.02	.66	7.42	.74	5.31
19		.29	4.32	.38	4.32	**	**	.58	3.79
23	1	.25	4.13	.32	3.79	.50	4.53	.54	4.13
	7	.32	4.53	.39	4.13	.31	7.42	.35	2.09
13		.20	12.34	.27	7.42	.28	7.42	.49	2.48
19		.20	3.15	.25	8.83	.20	8.83	.30	2.14
24	1	.14	9.75	.18	14.22	**	**	.36	2.30
	7	*	*	.15	14.22	.27	12.34	.35	2.24
13		.15	8.06	.21	7.42	.40	3.95	.59	4.32
19		.36	2.78	.40	4.32	.36	8.06	.59	2.42
25	1	.31	8.06	.37	8.06	.35	8.06	.43	5.02
	7	.23	8.06	.31	8.06	.33	8.83	.39	10.89
13		.22	10.89	.31	6.87	.35	9.75	.43	10.89
19		.20	14.22	.28	7.42	.63	3.64	1.01	4.13
26	1	.47	3.95	.57	3.95	1.08	5.99	1.66	5.63
	7	1.02	5.02	.99	5.99	1.63	6.87	2.04	6.87
13		1.27	8.06	1.50	6.87	1.13	7.42	1.49	8.06
19		1.08	6.40	1.12	6.87	.98	6.87	1.19	6.40
27	1	.93	5.99	.90	6.87	.78	8.83	.86	8.06
	7	.73	4.53	.72	8.83	.54	10.89	.61	8.06
13		.30	10.89	.48	10.89	.50	12.34	.55	4.53
19		.37	14.22	.47	9.75	.36	12.34	.51	6.87
28	1	.22	14.22	.34	12.34	.28	14.22	.36	12.34
	7	.23	4.53	.27	14.22	.43	3.15	.51	3.26
13		.28	2.95	.40	2.86	.87	3.95	.88	4.32
19		.86	4.32	.79	4.32	1.21	4.53	1.52	4.76
29	1	1.02	4.76	1.12	4.53	1.44	6.40	1.62	5.99
	7	1.05	5.99	1.45	5.99	1.61	6.40	1.89	6.40
13		1.17	6.40	1.41	6.40	1.19	6.40	1.32	6.40
19		.97	6.40	1.12	6.87	.89	8.83	.96	7.42
30	1	.75	6.40	.88	8.83	.99	8.06	.97	8.06
	7	.74	7.42	.87	8.83	.77	8.06	.77	5.99
13		.52	5.99	.69	8.06	.72	8.83	.66	8.83
19		.53	20.48	.60	8.83	.63	8.06	.60	7.42
31	1	.34	16.79	.53	8.83	.79	3.38	.75	3.64
	7	.56	16.79	.72	3.51	1.19	6.40	1.32	6.40
13		.65	5.99	.98	5.63	.93	8.83	.93	8.06
19		.59	16.79	.75	8.83				
	MEAN	.64	7.55	.80	7.70	.89	7.86	1.05	6.40
	STD	.40	3.10	.53	2.18	.54	2.63	.61	2.30

*=Electronic problem

**=Severe icing of gage

CERC Gage Number 630, Waverider 6 km from shore



CERC Gage Number 625, pier station 19+00

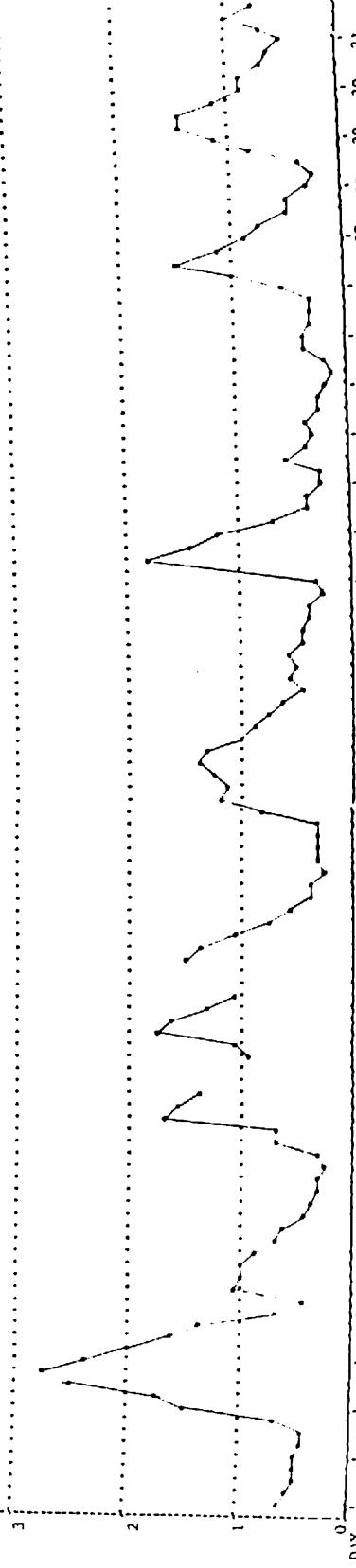


FIGURE 3. Time History of Wave Heights and Periods
January 1985
Part I: Heights

CERC Gage Number 630, Waverider 6 km from shore

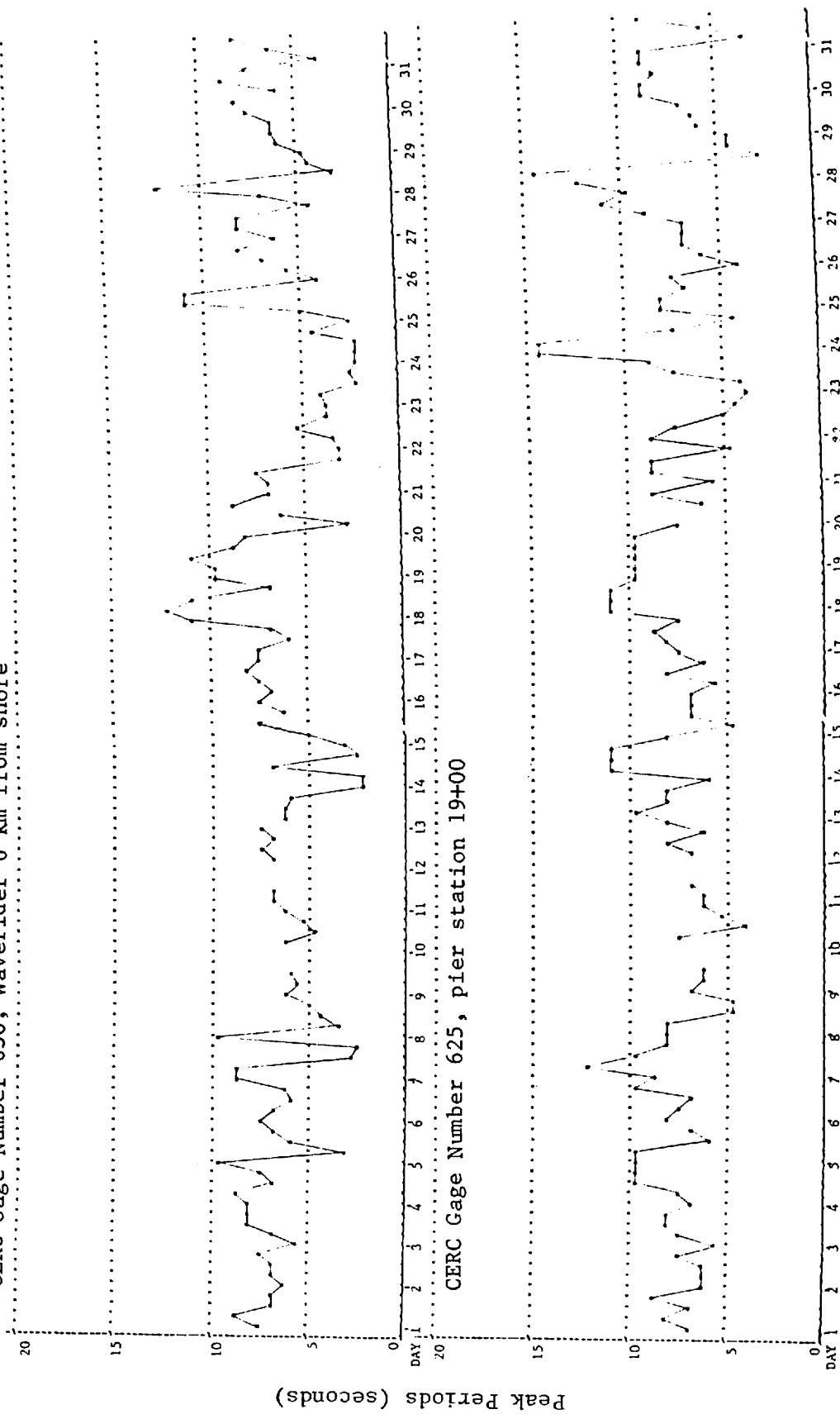


FIGURE 3. Time History of Wave Heights and Periods - January 1985 Part II:Periods

IV. CURRENT DATA

Current data (Table 4) are collected from two Marsh-McBirney electromagnetic biaxial current meters (Table 1 and Figure 2) and by visually observing the movement of dye on the water surface in the surf and at the seaward end of the pier, as well as 500 m updrift of the pier 12 m offshore.

Since the shoreline orientation is approximately N20°W, alongshore currents flow either toward 340° (i.e. northward) or toward 160° (i.e. southward). Similarly, cross-shore currents are either onshore (westward) or offshore (eastward).

All current speeds are given in centimeters per second.

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

TIME	PIER MEASUREMENTS			BEACH MEASUREMENTS (500 UPDRIFT)			CURRENT METER AT SOUTH TRIPOD
	DYE AT	CURRENT METER		DYE AT MID-SURF ZONE	DYE	AT SOUTH TRIPOD	
	19+00	AT 14120(433m)		(SURFACE)	12M OFFSHORE	(DEPTH -4.8m MSL)	
13 0100-Alongshore							
Cross-shore		0					
Resultant		2	DN				
		2	250				
13 0700-Alongshore	13	N	1	N			
Cross-shore	8	Off	0				
Resultant	15	11	1	340	0	0	
					131	9	
						Off	
						9	
						70	
13 1300-Alongshore							
Cross-shore		22	N				
Resultant		5	DF				
		23	354				
13 1900-Alongshore							
Cross-shore		11	N				
Resultant		4	OF				
		11	358				
14 0100-Alongshore							
Cross-shore		8	N				
Resultant		0					
		8	340				
14 0700-Alongshore	22	N	4	N			
Cross-shore	10	Off	1	DF			
Resultant	24	4	4	349	32	N	
					140	5	
						Off	
						32	
						349	
14 1300-Alongshore							
Cross-shore		1	2	N			
Resultant		0					
		2	340				
14 1900-Alongshore							
Cross-shore		6	N				
Resultant		1	OF				
		6	349				
15 0100-Alongshore							
Cross-shore		1	N				
Resultant		0					
		1	340				
15 0700-Alongshore	55	S	12	S			
Cross-shore	8	Off	6	DN			
Resultant	56	151	14	188	41	S	
					166	24	
						Off	
						47	
						129	
15 1300-Alongshore							
Cross-shore		15	S				
Resultant		9	ON				
		18	189				
15 1900-Alongshore							
Cross-shore		13	S				
Resultant		7	ON				
		15	186				
16 0100-Alongshore							
Cross-shore		22	S				
Resultant		8	DN				
		24	180				
16 0700-Alongshore	87	S	23	S			
Cross-shore	0	0	9	DN			
Resultant	87	160	25	181	122	S	
					187	0	
						0	
						122	
						160	
16 1300-Alongshore							
Cross-shore		19	S				
Resultant		8	ON				
		21	182				
16 1900-Alongshore							
Cross-shore		13	S				
Resultant		5	DN				
		14	180				
17 0100-Alongshore							
Cross-shore		2	S				
Resultant		2	DN				
		2	206				
17 0700-Alongshore	0	0	5	N			
Cross-shore	5	Off	2	OF			
Resultant	5	70	6	3			
					164	19	
						Off	
						19	
						151	
17 1300-Alongshore							
Cross-shore		6	N				
Resultant		4	DF				
		8	17				
17 1900-Alongshore							
Cross-shore		0					
Resultant		0					
		1	0				
18 0100-Alongshore							
Cross-shore		10	S				
Resultant		8	DN				
		13	198				
18 0700-Alongshore	18	S	12	S			
Cross-shore	2	Off	3	DN			
Resultant	18	154	13	171	41	N	
					174	43	
						Off	
						59	
						26	
18 1300-Alongshore							
Cross-shore		12	S				
Resultant		1	ON				
		12	167				
18 1900-Alongshore							
Cross-shore		9	S				
Resultant		2	DN				
		9	175				

KEY = All speeds in cm/sec
 N = Northward, Shore Parallel
 S = Southward, Shore Parallel
 DN = Downshore
 DF = Offshore

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

ELEM_MEASUREMENTS

BEACH MEASUREMENTS
(500' UPDRIFT)

CURRENT METER
AT 14420(433m)
(579m) I.D.#639
SURFACE)(DEPTH -4.2m MSL)

	DYE AT TIME	CURRENT METER	DYE AT MID-SURF ZONE	DYE AT SOUTH TRIFID
		(S)	(SURFACE)	(DEPTH -4.8m MSL)
25	0100-Alongshore	1 5		0
	Cross-shore	1 ON		1 ON
	Resultant	1 234		1 250
25	0700-Alongshore	17 N 4 N		7 N
	Cross-shore	5 Off 1 OF		1 ON
	Resultant	18 357 4 352		8 334
25	1300-Alongshore	0		2 N
	Cross-shore	0		2 312
	Resultant	0 0		3 N
25	1900-Alongshore	0		1 ON
	Cross-shore	1 ON		3 329
	Resultant	1 250		18 S
26	0100-Alongshore	14 S		1 ON
	Cross-shore	6 ON		18 162
	Resultant	16 184		
26	0700-Alongshore	76 S 13 S		15 S
	Cross-shore	8 Off 7 DN		3 ON
	Resultant	77 154 15 189		15 179
26	1300-Alongshore	31 S		39 S
	Cross-shore	10 ON		1 OF
	Resultant	33 178		39 159
26	1900-Alongshore	1 13 S		20 S
	Cross-shore	1 5 DN		0
	Resultant	1 14 180		20 160
27	0100-Alongshore	10 S		14 S
	Cross-shore	7 ON		1 OF
	Resultant	12 194		14 155
27	0700-Alongshore	12 N 2 S		
	Cross-shore	6 off 3 DN	152 0 0	3 S
	Resultant	14 7 3 212	4 Off 4 70	0 160
27	1300-Alongshore	6 N		13 N
	Cross-shore	2 OF		2 ON
	Resultant	6 356		13 331
27	1900-Alongshore	7 N		16 N
	Cross-shore	3 OF		0
	Resultant	8 1		16 340
28	0100-Alongshore	6 N		9 N
	Cross-shore	1 OF		1 OF
	Resultant	5 352		9 343
28	0700-Alongshore	12 N 5 N		
	Cross-shore	7 Off 1 OF	140 9 N	0
	Resultant	14 11 5 354	4 Off 10 4	11 340
28	1300-Alongshore	6 S		4 S
	Cross-shore	2 ON		1 OF
	Resultant	6 175		4 148
28	1900-Alongshore	10 S		14 S
	Cross-shore	3 ON		1 OF
	Resultant	11 177		14 152
29	0100-Alongshore	19 S		25 S
	Cross-shore	7 ON		0
	Resultant	20 181		25 160
29	0700-Alongshore	87 S 1 24 S		
	Cross-shore	9 On 8 ON	164 87 S	0
	Resultant	88 166 26 178	30 On 92 179	37 160
29	1300-Alongshore	26 S		1 161
	Cross-shore	8 ON		
	Resultant	27 178		21 S
29	1900-Alongshore	10 S		1 161
	Cross-shore	2 ON		
	Resultant	10 174		21 163
30	0100-Alongshore	4 S		7 S
	Cross-shore	3 ON		0
	Resultant	6 197		7 160
30	0700-Alongshore	16 S 5 S		
	Cross-shore	0 0 0	177 19 S	3 OF
	Resultant	16 160 5 160	14 Off 24 123	11 144
30	1300-Alongshore	11 S		
	Cross-shore	1 ON		1 OF
	Resultant	12 166		13 154
30	1900-Alongshore	7 S		10 S
	Cross-shore	0		0
	Resultant	7 160		10 160
31	0100-Alongshore	1 S		3 S
	Cross-shore	2 ON		2 ON
	Resultant	2 209		4 164
31	0700-Alongshore	23 N 2 N		
	Cross-shore	4 On 1 OF	183 44 N	4 DF
	Resultant	24 331 2 7	0 0 44 360	4 60
31	1300-Alongshore	1 N		
	Cross-shore	1 ON		5 ON
	Resultant	1 209		7 209
31	1900-Alongshore	4 S		6 S
	Cross-shore	7 ON		0
	Resultant	8 218		6 160

KEY = All speeds in cm/sec
N = Northward, Shore Parallel
S = Southward, Shore Parallel
ON=Onehour
OF=Offshore

V. SUPPLEMENTAL OBSERVATIONS

Visual wave direction measurements (Table 5) taken at the seaward end of the pier are made of both the primary wave train (i.e. that having the larger wave heights) and the secondary wave train (which must be clearly distinguishable as a wave train separate from the primary waves) but not surface chop or capillary waves. The direction of the primary wave train just north of the seaward end of the pier is also determined using a Raytheon Marine Pathfinder radar and measuring alignment of the wave crests. The pier axis (considered perpendicular to the beach at the FRF) is oriented 70° east of true north; consequently, wave angles greater than 70° imply the waves were coming from the south side of the pier.

The width of the surf zone (seawardmost breaker position to shoreline) is determined from the pier deck.

Measurements of surface water temperature, density, and visibility are made daily at the seaward end of the FRF pier. A jar along with a thermometer is lowered about .3 m (1 ft) into the water and allowed to remain for at least one minute. The jar is removed, the temperature read and a hydrometer is used to determine the density. A secci disc is used to determine the surface visibility.

Table 5
SUPPLEMENTAL OBSERVATIONS
January 1985

DAY	TIME	WAVE APPROACH ANGLE AT PIER END (° from True N)		RADAR WAVE ANGLE (° from True N)	WIDTH OF SURF ZONE(M)	WATER CHARACTERISTICS AT PIER END		
		PRIMARY	SECONDARY			TEMP (°C)	DENSITY (g/cc)	SECCI VIS(M)
1	1000	110			55	12.0	1.0226	2.7
2	0900	100			55	11.6	1.0240	2.4
3	0830	50			219	11.5	1.0247	0.9
4	0830	60			160	10.5	1.0210	0.9
5	0940	30			12	10.7	1.0248	0.3
6	0900	30			98	10.0	1.0250	0.9
7	0830	65			15	10.5	1.0255	1.5
8	0830	20			18	10.5	1.0262	1.2
9	0800	55			134	9.5	1.0262	0.9
10	0930	50		60	98	7.5	1.0240	0.9
11	0900	55	90	60	122	7.0	1.0226	0.9
12	0750	45			134	6.5	1.0242	0.6
13	1000	50			23	7.0	1.0234	1.5
14	0830	135			110	8.5	1.0258	2.1
15	0900	60		60	94	8.0	1.0262	0.9
16	0800	60	..	60	183	6.0	1.0258	0.6
17	0800	90		90	125	5.5	1.0256	0.6
18	0830	100	45		111	6.5	1.0262	2.1
19	0850	80	140		15	6.8	1.0258	1.2
20	0830	90			11	7.0	1.0262	2.1
21	0830	90			21	5.0	1.0264	1.2
22	0800	5			11	3.0	1.0266	1.5
23	0815				6	4.0	1.0264	2.1
24	0930	100			9	4.5	1.0264	3.0
25	0930	80			9	5.0	1.0264	3.0
26	0930	20			125	5.0	1.0266	0.9
27	0845	50			76	3.3	1.0268	1.5
28	0730	120			12	4.0	1.0265	1.2
29	0730	40			152	3.5	1.0266	0.9
30	0730	80	30		133	3.5	1.0263	1.8
31	0730	110			110	4.0	1.0260	1.2

VI. WATER LEVELS

The National Ocean Services (NOS) has established a primary tide station (No. 865-1370) at the seaward end of the FRF pier. A Leupold-Stevens digital recording float-type tide gage is used to collect data every 6 minutes throughout the month.

Figure 4 shows the range of each cycle while Figure 5 shows the variation in mean water levels computed over a tidal cycle period (12.42 hours), and contains a list of selected mean and extreme values. This presentation is useful in identifying effects of both meteorological and astronomical forces on the open coast water levels.

Table 6 contains the time of the center of each sampling interval and the range, high, low, and mean water levels during each tidal cycle.

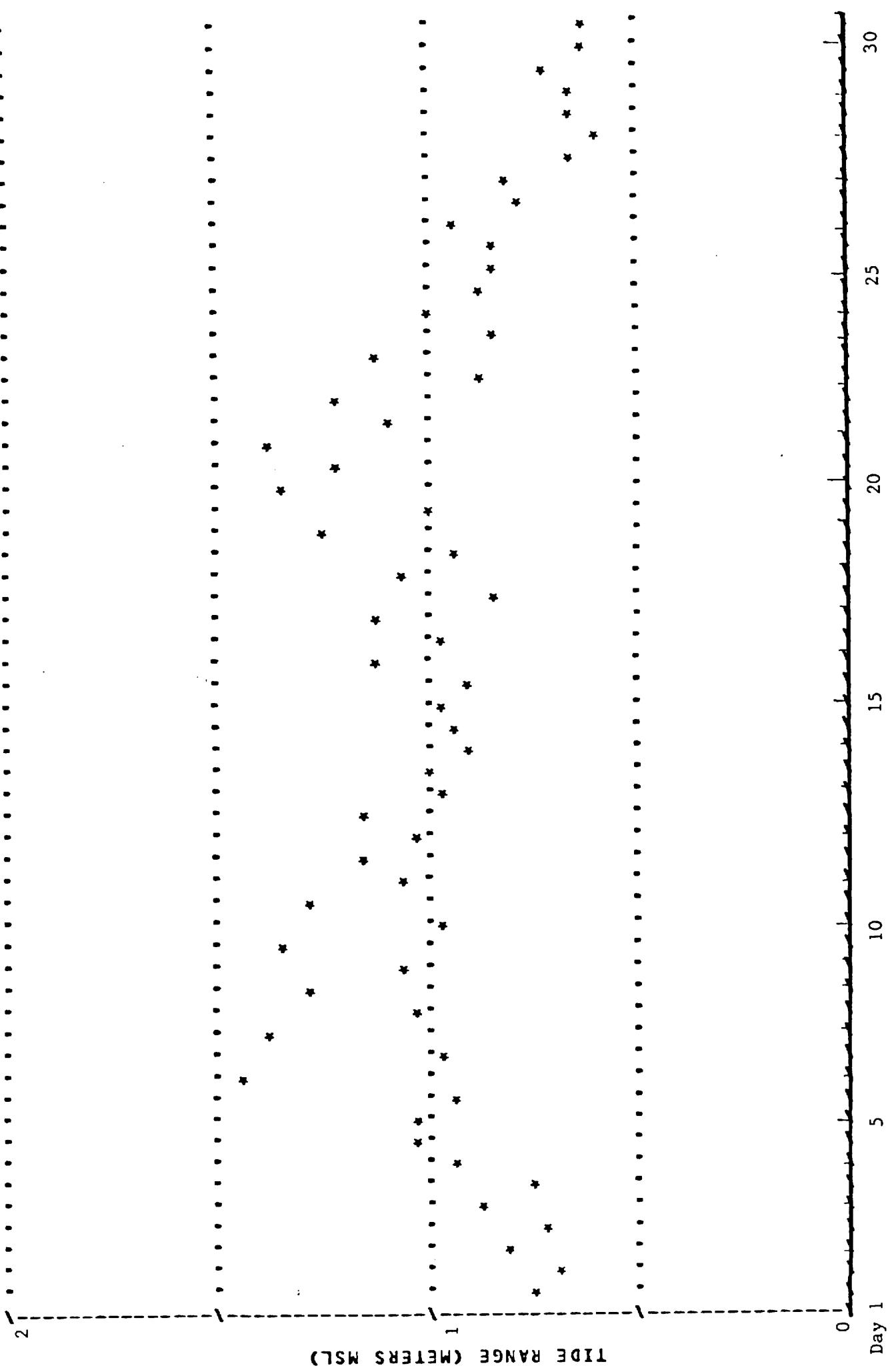


FIGURE 4. Time History of Tide Range, January 1985 (Gage No. 865-1370)

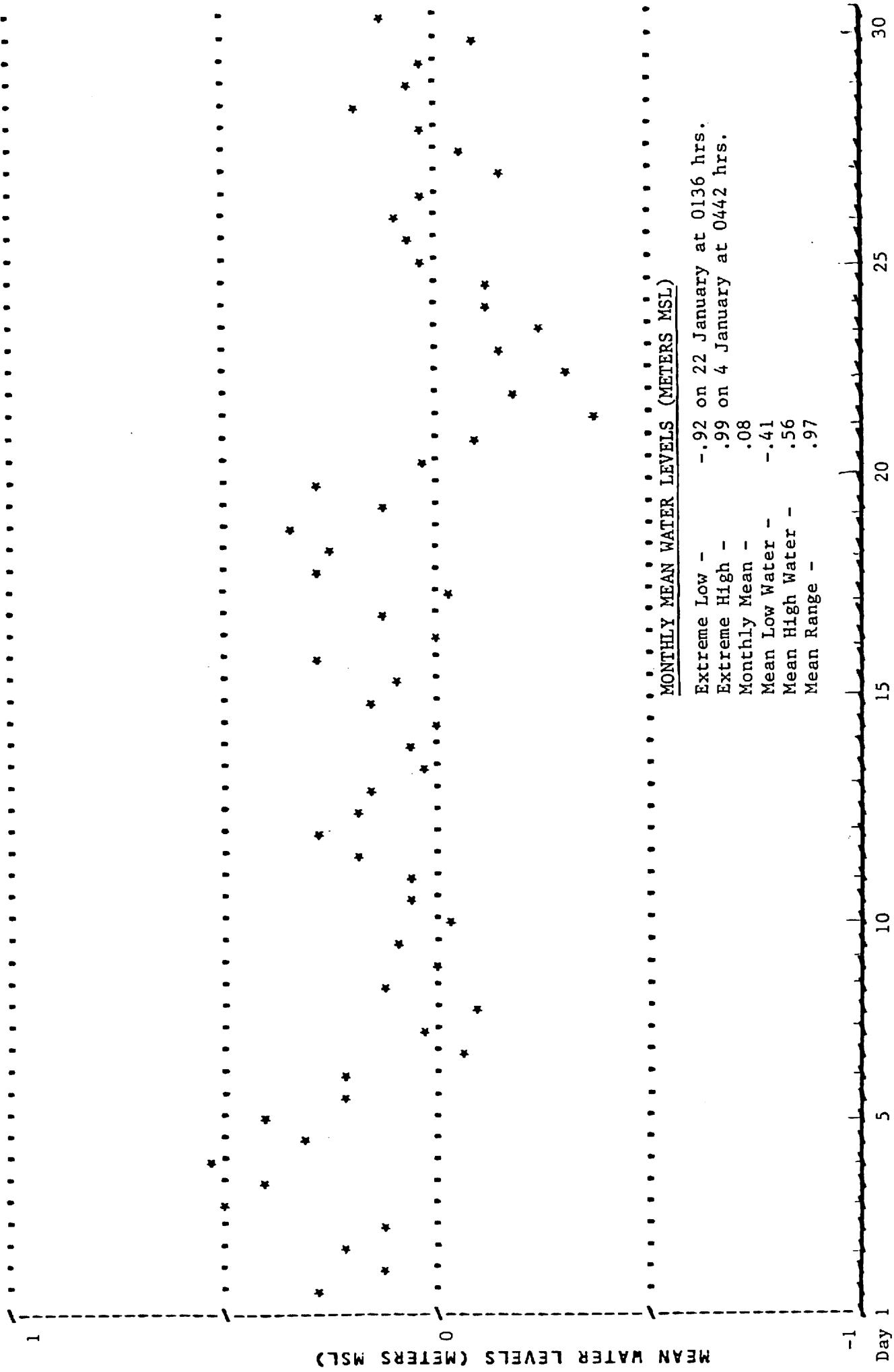


FIGURE 5. Time History of Mean Water Levels, January 1985 (Gage No. 865-1370)

TABLE 6
WATER LEVELS (METERS MSL)
Tidal Characteristics
January 1985

MID-CYCLE DAY TIME		LOW	HIGH	MEAN	RANGE
1	612	-.09	.67	.28	.76
1	1837	-.25	.43	-.12	.68
2	702	-.20	.63	.20	.83
2	1928	-.22	.49	.14	.71
3	753	.07	.93	.49	.86
3	2018	-.01	.74	.39	.76
4	843	.04	.99	.54	.95
4	2108	-.23	.80	.33	1.03
5	934	-.16	.86	.39	1.02
5	2159	-.25	.70	.22	.95
6	1024	-.48	.96	.21	1.44
6	2249	-.58	.38	-.07	.97
7	1114	-.69	.70	-.02	1.39
7	2340	-.63	.40	-.08	1.02
8	1205	-.48	.79	.12	1.27
9	30	-.55	.50	.00	1.05
9	1255	-.54	.80	-.09	1.34
10	120	-.56	.41	-.04	.98
10	1346	-.57	.72	.06	1.29
11	211	-.48	.59	.05	1.07
11	1436	-.40	.76	.18	1.16
12	301	-.25	.79	.18	1.14
12	1526	-.37	.77	.18	1.03
13	352	-.32	.64	.16	.97
13	1617	-.48	.53	.02	1.01
14	442	-.39	.51	.07	.90
14	1707	-.47	.46	-.01	.93
15	532	-.34	.62	.15	.95
15	1758	-.38	.52	.09	.90
16	623	-.30	.84	.28	1.14
16	1848	-.50	.46	-.01	.96
17	713	-.44	.69	.12	1.13
17	1938	-.49	.36	-.05	.85
18	804	-.22	.84	.29	1.06
18	2029	-.23	.72	.24	.94
19	854	-.29	.98	.34	1.26
19	2119	-.39	.61	.13	1.01
20	944	-.49	.85	.27	1.34
20	2210	-.60	.61	.02	1.21
21	1035	-.80	.59	-.08	1.39
21	2300	-.92	.17	-.37	1.10
22	1125	-.80	.41	-.19	1.20
22	2350	-.77	.09	-.32	.86
23	1216	-.73	.40	-.17	1.14
24	41	-.70	.13	-.26	.83
24	1306	-.59	.41	-.11	1.00
25	131	-.56	.30	-.14	.86
25	1356	-.38	.45	.03	.84
26	222	-.37	.48	.06	.85
26	1447	-.35	.58	.10	.93
27	312	-.36	.42	.03	.78
27	1537	-.55	.25	-.15	.80
28	402	-.41	.24	-.06	.65
28	1628	-.27	.31	-.04	.59
29	453	-.12	.54	.18	.66
29	1718	-.27	.39	.05	.66
30	543	-.31	.41	.04	.72
30	1808	-.42	.20	-.09	.62
31	634	-.20	.44	.12	.64

VII. NEARSHORE PROFILES

A. Nearshore Profiles. In order to document profile response away from the pier, surveys of four profile lines extending 900 to 1,000 m from shore and located 489 and 581 m north and 517 and 608 m south of the FRF pier are conducted bi-weekly, after storms, and during more complete bathymetric surveys.

These profiles are obtained using the CRAB-Zeiss surveying system; a Zeiss Elta-2 first-order, self-recording electronic theodolite distance meter in combination with the Coastal Research Amphibious Buggy (CRAB), a 10.7 m high, self-powered, mobile tripod on wheels.

Figure 6 shows the last survey in December 1984 and the three surveys taken during January on profile line 188, located 517 m south of the pier. The January surveys depict the dynamic evolution of the nearshore bar. The last survey in December showed no nearshore bar present on the profile. On the following survey taken on 2 January, a very small bar had formed at 200 m. However, by 5 January (following a storm on 3-4 January) the bar (200 to 280 m) had become much better defined, and by the end of the month had migrated 40 m seaward retaining its distinctive shape. Only minor changes are visible on the remainder of the profile.

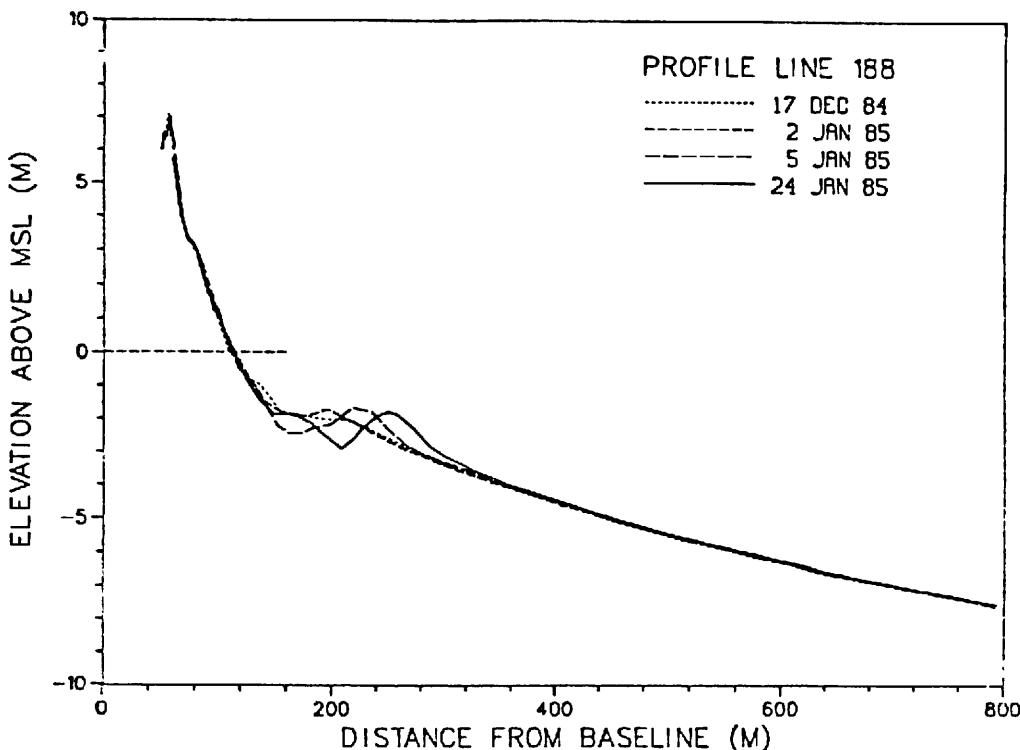


Figure 6. Monthly CRAB profiles on profile 188 - 517 meters south of pier.

The profile envelope (Figure 7) reflects the maximum changes which occurred on the profile during January.

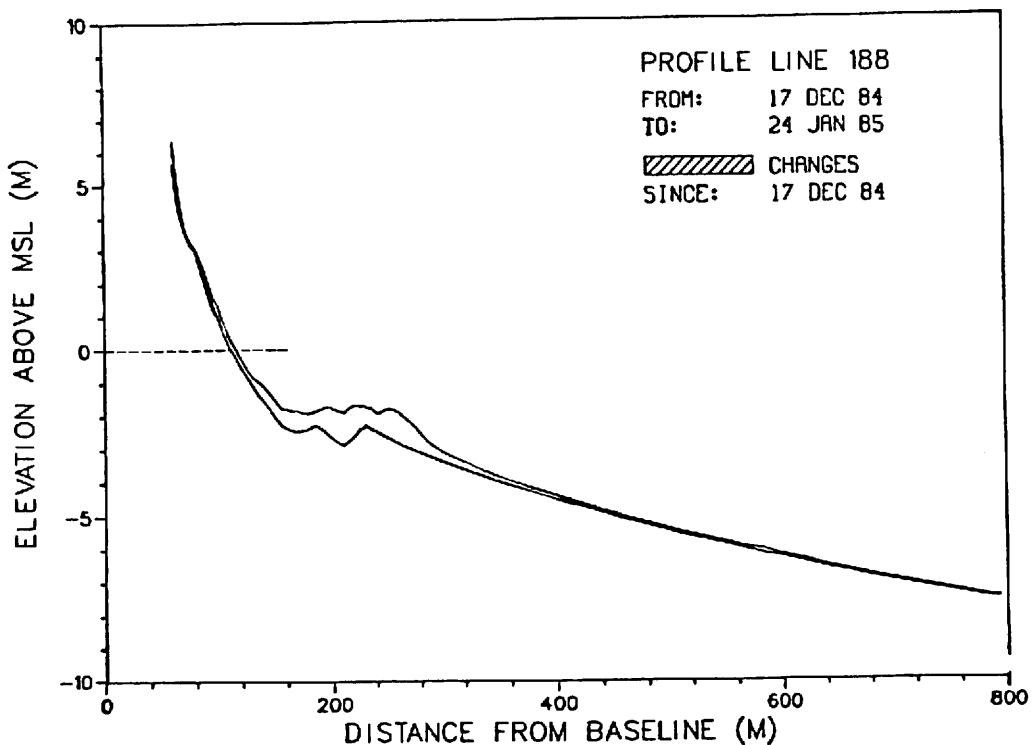


Figure 7. CRAB profile envelope - profile 188.

B. Bathymetry. There was no bathymetric survey during January. The last survey taken during November 1984 is included for reference.

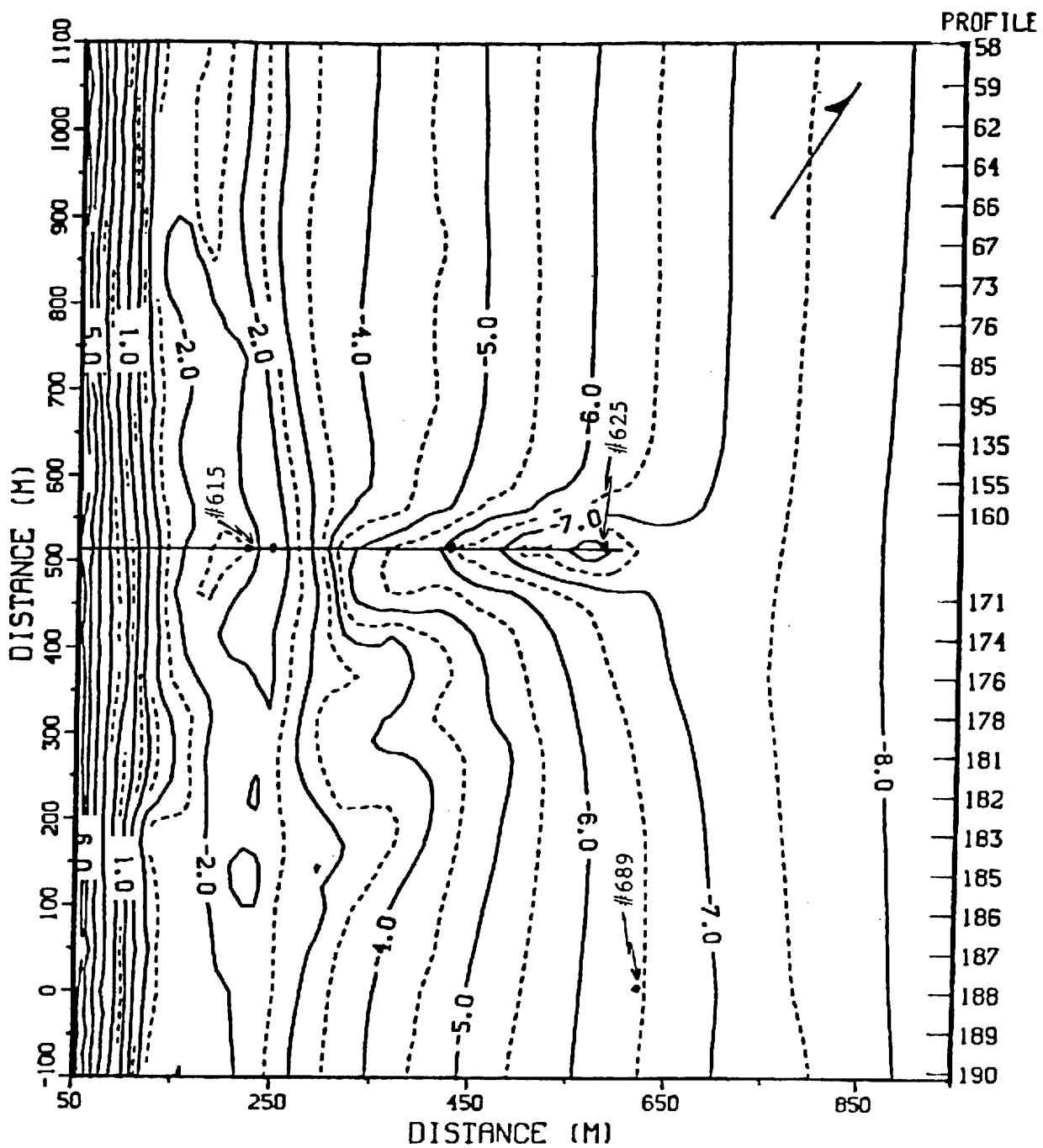


FIGURE 8. FRF BATHYMETRY 27 NOV 84
CONTOURS IN METERS

VIII. SPECIAL EVENTS

A. Storm Data Collection. The following list identifies times when the wave height at the seaward end of the pier (i.e. as measured by the Baylor gage #625 at pier station 19+00) exceeded 2 m and wave records were obtained every hour:

<u>Start</u>	<u>End</u>
3 Jan (0900)	4 Jan (0600)

B. Storm Synopsis (3 January 1985 through 4 January 1985). A cold front extending from New England to the Gulf of Mexico began moving eastward on 2 January and crossed the North Carolina coastline early on 3 January. A low pressure system developed over the Gulf of Mexico and travelled rapidly up the east coast behind the front.

Winds exceeded 14 m/s (NE) and the maximum Hmo (at Baylor gage #625), 2.70 m, was recorded during the evening of 3 January. The lowest barometric reading was 1005 mb, recorded at 1300 hours on 4 January. Total precipitation was 46 mm.

Distribution List

Government Agencies:

OCE	US Geological Survey
BERH	US National Park Service
NAO	US Naval Academy
NASA/Wallops Flight Center	US Naval Civil Engineering Lab
NOAA (NOS, NWS)	US Naval Facilities Engineering Com.
SAD	US Naval Research Lab
SAW	

Colleges/Universities:

California Inst. of Tech.	Texas A&M University
Duke University	University of Akron
East Carolina University	University of Delaware
Florida Inst. of Tech.	University of Florida
Louisiana State University	University of Maryland
NC State University	University of North Carolina
Old Dominion University	University of Northern Colorado
Oregon State University	University of Rhode Island
Prince George's College	University of Virginia
Rutgers University	Virginia Inst. of Marine Science
Scripps Inst. of Oceanography	

Others:

City of Va. Beach, VA	Moffatt & Nichol, Engineers
Coastal Barge Corporation	Offshore Coastal Technologies
Coastal and Estuarine Research, Inc.	Research Planning Institute, Inc.
Dr. Galvin	Mr. Rowland
GEOMET, Inc.	Mr. Savage
Dr. Hylton	Sea Port Supply Corp.
Ms. Johnson	Shell Development
Mary Marr, Inc.	Sohio Petroleum Co.
Masonite Corporation	Mr. & Mrs. Valpey

Foreign:

W. F. Baird & Assoc. Coastal Engineers, Ltd (Canada)
Ministry of Construction, Coastal Division (Japan)
Norwegian Hydrodynamic Laboratories (Norway)
University of New South Wales (Australia)
University of Sydney (Australia)